

Photosynthesis and You

In this lesson, students will learn about the process by which plants make their own food. Students will understand how photosynthesis provides the food they eat. Visit https://www.agclassroom.org/nh/matrix/lessonplan.cfm?lpid=302&search_term_lp=photosynthesis for more lesson details and information. Recommended for grades K-2.

MATERIALS: Three identical plants: One planted in potting soil, two planted in sand (tomato seedlings work well)
One heavy, brown paper bag
Crayons, colored pencils or markers for students Fun With the Plant Nutrient Team student activity book, page 6
(A free copy can be ordered from [Nutrients for Life](#), or contact our office for a digital copy of the page)
[Photosynthesis and You worksheet](#) (also available through the link in the first paragraph)

EXPERIMENT: Have students turn to page six in their [Fun With The Plant Nutrient Team student activity book](#). Explain that they will be carrying out this experiment as a class. Explain that plants A, B, and C are all the same types of plants and are the same age. Note: tomato seedlings work well for this experiment. The class will note their observations of the three plants on days 1, 4, 7, 11, and 14 on page six.

1. Show students that Plant A is planted in sand and will be watered with distilled water. Explain that distilled water has been filtered so it does not contain any minerals or nutrients. Plant A will be set in a place where it receives sunlight for most of the day.
2. Show students that Plant B is planted in potting soil that contains the important nutrients for plant growth. Plant B will be watered with tap water and will be set in a place where it receives sunlight for most of the day. Explain that tap water has been treated so it is safe for people to drink and may also contain some minerals.
3. Show students that Plant C is planted in sand and will be watered with tap water. Place Plant C inside a heavy brown paper bag so it does not receive sunlight.
4. Ask students to predict which plant will be the healthiest at the end of the experiment and why. Tally votes on the board and make a bar graph of class predictions.
5. Give all three plants the same amount of water on the same days as needed.
6. Allow students 5-10 minutes to observe the plants and write down their observations on days 1, 4, 7, 11, and 14. Older students can write down notes with descriptive observations while younger students can use the smiley faces on page six.
7. On day 14 of the experiment, compare the results with the class predictions. What plant is the healthiest and why? What plant did not do well and why? Discuss these questions and answers as a class.
8. Explain that Plant C did not get sunlight and therefore, was not able to carry out photosynthesis to make its own food. When a plant cannot make its own food, it doesn't have energy to carry out life processes and it will become sick or die. Plant C was also planted in sand, which does not contain the nutrients that are important for plants to survive.
9. Explain that Plant A was planted in sand, which does not contain the nutrients that are important for plants to survive. It was also watered with distilled water, which doesn't have any nutrients. For these reasons, plant A didn't grow much and wasn't very healthy at the end of the experiment.
10. Explain that Plant B is likely the healthiest because during the experiment it received everything a plant needs to grow and be healthy. Plant B received sunlight, water, and potting soil that contained important nutrients for plant growth.
11. Ask students why it is important to have healthy plants that can carry out the process of photosynthesis. Explain that we depend on photosynthesis for plants to make the food that we eat. Use a bowl of cereal and milk as an example. Where did the wheat, rice, or corn in the cereal come from? (plants) Where did the milk come from? (a cow) What do cows eat? (plants/grass)

Worksheet Procedure

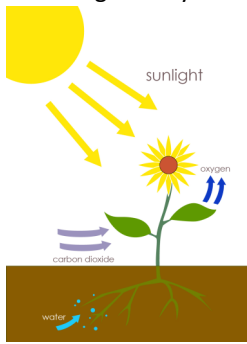
1. Provide the student handout, *Photosynthesis and You*, to older students and read aloud as a class. For younger students, summarize the main points of the reading to provide background information for the drawing activity.
2. Lead students through the photosynthesis drawing activity step by step.

Concept Elaboration and Evaluation

After conducting these activities, review and summarize the following key concepts:

- * Plants provide food for us to eat.
- *Plants rely on the sun to obtain energy to grow.

The process is called photosynthesis.



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www.agclassroomn.org/nh email: nhaitc@nhfarmbureau.org



Annual Agricultural Literacy Program
2018 Educator Resource Guide

Dear Friends and Educators,

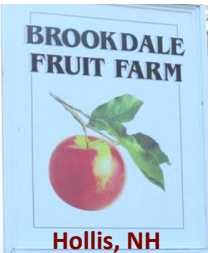
The mission of New Hampshire Agriculture in the Classroom is to help students increase their understanding and appreciation of the role that agriculture plays in their daily lives. We strive to achieve this through teacher workshops, school to farm field trips, a monthly newsletter and more.

Each year we offer an Annual Literacy Program where we select an agriculturally accurate book, then send volunteers into schools throughout the state to read the book and to share related information with the students. Following the presentation, the book is donated to the school for continued enjoyment and learning. We also provide lesson ideas to help supplement the school visit. Teachers are encouraged to utilize these resources to round out the lessons with activities based in science, language arts, social studies, etc. You can find those resources, plus additional information pages, worksheets and activities on our website, www.agclassroom.org/nh. Upon completion of the program, we ask that both teachers and volunteers complete a brief survey to evaluate our effectiveness. A hard copy is enclosed or you may complete it online at <https://www.surveymonkey.com/r/RBHQW8>.

The book selected for this year's program is *Seed Soil Sun* by Cris Peterson. This book uses wonderful photographs to explore soil, follow germination, look at composting, touch on photosynthesis and discover the edible parts of a plant.

This year, we are thrilled to have support from [Hubbard Farms](#), [Lavoie's Farm](#), [Brookdale Fruit Farm](#) and [Wilson Farm](#). Please visit their websites for additional information about their work. We hope that you find this material useful and that your students enjoy learning about the soil, seeds and photosynthesis. If you are interested in integrating other agricultural topics or programs into your curriculum, please don't hesitate to contact us at (603) 224-1934, email nhaitc@nhfarmbureau.org or visit our website at www.agclassroom.org/nh.

Sincerely,
Debbi Cox
State Coordinator



What Part of the Plant Do We Eat?

Courtesy of "Daddy's Tractor"

Sort real, plastic or pictures of vegetables into groups by the plant part which we consume. For example, the tomatoes are the fruit of the plant, carrots are the roots and corn is the seed.

Flowers



Cauliflower



Broccoli



Artichoke



Carrots



Radishes



Potatoes



Sweet Potatoes



Cabbage



Lettus



Spinach

Stems



Rhubarb



Asparagus



Celery



Corn



Beans



Peas



Popcorn



Tomatoes



Peppers



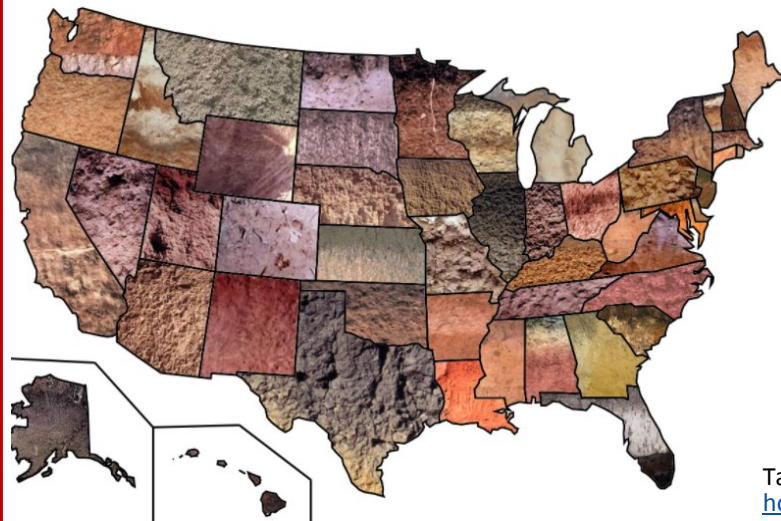
Cucumbers

Pumpkins

Seeds

Fruits

Soils Across the United States



Every part of the country has one or a mixture of the six different soil types. The soil's classification is based on the texture and size of the particles in the soil, as well as on the mineral and nutrient content of each



Taken from <http://agamerica.com/how-soil-type-affects-land-values/>

Soil Shake Up

You can do a simple shake test to find out how much clay, silt and sand is in your soil. All you need is a jar with a lid, a handful of soil and water.

1. Dig down into the ground about six inches and grab a handful of soil.
2. Put the soil into a jar. Fill it to the top with water and close the lid tightly. Shake the jar for a few minutes.
3. Set the jar down. Look for large particles of sand, which should settle at the bottom of the jar. Mark the top of this layer with a pen or tape.
4. Wait an hour. Look for a layer of smaller silt particles, which should settle above the sand. Mark the top of this layer.
5. Wait a day and look at the jar again. The water should be clear. Look for a layer of the smallest clay particles to settle on top of the silt. Mark the top of this layer. The size of the layers tells you how much sand, silt, or clay is in your soil.



Create A New Hampshire Soil Profile

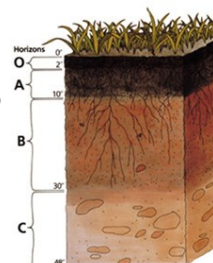
BACKGROUND: If you look in a soil pit or on a roadside cut, you will see various layers in the soil. These layers are called **soil horizons**. The arrangement of these horizons in a soil is known as a **soil profile**. Soil scientists, who are also called pedologists, observe and describe soil profiles and soil horizons to classify and interpret the soil for various uses. Soil horizons differ in a number of easily seen soil properties such as color, texture, structure, and thickness. Other properties are less visible. Properties, such as chemical and mineral content, consistence, and reaction require special laboratory tests. All these properties are used to define types of soil horizons. Soil scientists use the capital letters **O, A, B, C,** and **E** to identify the master horizons, and lowercase letters for distinctions of these horizons. Most soils have three major horizons -- the surface horizon (**A**), the subsoil (**B**), and the substratum (**C**). Some soils have an organic horizon (**O**) on the surface, but this horizon can also be buried. The master horizon, **E**, is used for subsurface horizons that have a significant loss of minerals (eluviation). Hard bedrock, which is not soil, uses the letter **R**.



PROJECT

1. Print the [soil profile cards](#) onto cardstock paper or draw your own design on a 3" x 5" note card. Cut the cards apart if necessary.
2. Attach a short strip of carpet tape to the card. Rolls of double-sided tape come in various widths. One-inch tape is adequate.
3. Pull back the tape at the top to expose some of the sticky tape and place soil from the surface horizon to represent the depth of this soil.
4. Pull back the tape for each additional layer one at a time following the same procedure. Properly dispose of the remaining tape piece.
5. The card can be placed in an envelope to protect it.
6. You might also collect a little surface vegetation to keep with your soil type for learning about plant-

Activity taken from the USDA Natural Resources Conservation Service. Find full lesson at https://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/edu/?cid=nrcs142p2_054308



Extension activities can be found at <https://www.education.com/download/worksheet/105292/soil-composition-1.pdf>

Seeds, Soil, Sun and See Them Sprout!

This lesson investigates the miraculous process of air and water combining with seeds, soil and sunlight to create nearly all the food we eat. By having students observe different types of seeds, this lesson takes plant germination one step further by having students record the differing growth rates and other observations in germination journals (template provided).

MATERIALS LIST:

A set for every group of students:
 Clear plastic cup
 A paper cup
 A variety of seeds
 A paper towel
 Water



For all grades, a great way to begin is to read and age-appropriate book on plant germination (see list in full lesson). Ask the students to hypothesize what they think is needed to successfully sprout seeds and grow plants that make our food, and record answers. For younger grades, consider a brief movement activity to emphasize the ingredients for growing plants: Seed = put thumb and finger together as if holding a small seed; soil = cup hands as if holding some soil; sun = arms overhead in a circle like the sun; rain = hands coming down like rain; air = softly blow towards your hand. This helps engage younger students more than older ones.

- 1) Divide students into groups of 2-5. Each group will receive a set of cups (one paper, one plastic), a paper towel and a packet of seeds. Students will need to work together and share in making the germination cups. Do students know what types of the seeds by looking at them? Have students hypothesize which will germinate fastest, and record guesses.
- 2) Wrap the paper towel around the paper cup; making sure there is a hole poked in the bottom of the paper cup (a pencil works well). The excess paper towel folds under the bottom. The paper cup is then set into the plastic cup.
- 3) Pour 1/2 cup water into the paper cup. The water will drip through the hole in the bottom of the paper cup and wicks up the paper towel, moistening it.
- 4) Take the seeds from the packet and place them on the outside of the wet paper towel wrapped around the cup. Space seeds evenly, half way down the cup. A pencil can help slide seeds into place.
- 5) Add another 1/2 cup water to keep the seeds moist and set cups where the class can watch the seeds germinate. Water the cups daily to keep the seeds moist. Seeds need water to germinate. Extension Activities: Germination Journals A template for making student journals to record the germination process is attached. To make the journals, print copies front to back. Have students fold and cut them to make a five day journal where they can record daily observations and track the germination process.

Visit <http://bit.ly/2irL4wW> for further planning instructions, additional activities, vocabulary, journal pages and more.

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Online Resources

New Hampshire State Soil: Every state has their own special soil type. Read about New Hampshire's Marlow Soil. https://www.nrcs.usda.gov/wps/portal/nrcs/detail/nh/soils/?cid=nrcs144p2_015724

The Scoop on Soils from The Globe Program is an online, printable story about soil with teacher's notes and a glossary. <https://www.globe.gov/web/elementary-globe/overview/soils/story-book>

Nutrients For Life Under Your Feet Reader explores soil science for grades 1 & 2. A variety of downloadable pages and worksheets. <https://www.nutrientsforlife.org/catalog/elementary-school-resources>

Growing Plants in Science and Literature, More Than an Empty Pot: Students will use the story of *The Empty Pot* to explore literature and science, practicing story mapping and learning about the needs of plants and the importance of soil and water. Like the characters in the story, students will plant and observe the growth of seeds. (we have *The Empty Pot* available for loan)
 Grades 1 & 2: https://www.agclassroom.org/nh/matrix/lessonplan.cfm?lpid=483&search_term_lp=soil
 Grades 3 & 4: https://www.agclassroom.org/nh/matrix/lessonplan.cfm?lpid=484&search_term_lp=soil

Properties of Soil: Students will learn that different soils have different characteristics and examine different types of soil that have been mixed with water and allowed to settle. Next, they investigate soil components and how air space allows soils to hold and transmit water. Grades 3-5: https://www.agclassroom.org/nh/matrix/lessonplan.cfm?lpid=185&author_state=0&grade=0,3&search_term_lp=soil

Maryland Agricultural Education Foundation's lesson plan: key ideas, props and supporting activities to support the book. http://www.maefonline.com/ag%20literacy_pdf/seed%20soil%20sun%20lesson%20plan.pdf